

1 2 **Comparing the Age Distributions of Indigenous and Non-Indigenous Australians**

3 4 **Requirements**

5 Graphing Calculator
Spread sheet software program

Optional

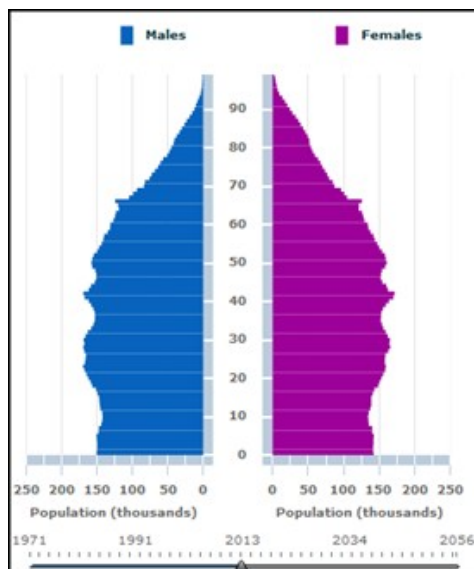
Computer
Internet connection

6 **Background**

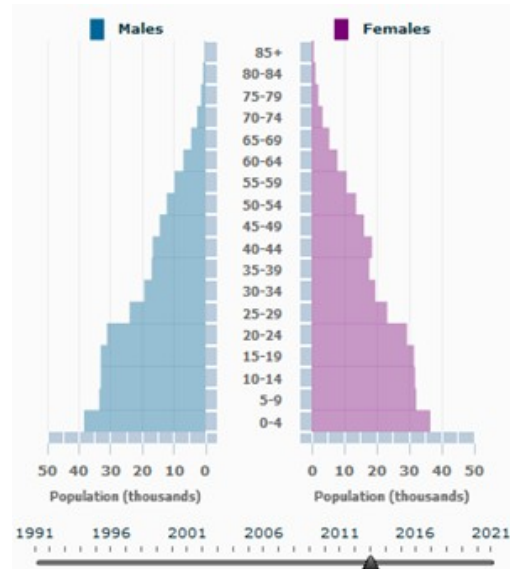
Every 5 years the Census collects population data and in intervening years estimated resident populations (ERP) are produced. In non-Census years 'non-Indigenous' population counts are created by subtracting Indigenous population estimates or projections from total ERP.

The following population pyramids show the projected age distributions of all Australians and Indigenous Australians for 2013 (Midway between the 2011 and 2016 Censuses). They can be found on the Australian Bureau of Statistics web site.

In this activity you will compare and report on the age distributions of Indigenous and Non-Indigenous Australians using various statistical measures and graphical displays.



Year: 2013
Total: 22,976,367
Males: 11,434,696
Females: 11,541,671



Year: 2013
Total: 601,655
Males: 299,856
Females: 301,799

FIGURE 1: POPULATION PYRAMID ALL AUSTRALIANS

FIGURE 2: INDIGENOUS

**SOURCE: ABS Population Pyramid
GLANCE-ABORIGINAL**

PEOPLES

7

**SOURCE: TOPICS AT A
AND TORRES STRAIT ISLANDER**

8 The Data

The following data tables relate to the age distribution for NSW. Data for other states and territories can be found in the each table and could also be used to compare data use Indigenous population projections.

2009-10 Indigenous age distribution NSW

2010 Non Indigenous age distribution NSW

age	(f)	Mid point	Cumulative Freq (fx)	(Xf)
Male 0-4	226,319	2	10,746	
Male 5-9	217,298	7	20,382	
Male 10-14	220,475	12	30,291	
Male 15-19	236,065	17	40,215	
Male 20-24	261,039	22	47,938	
Male 25-29	264,284	27	53,960	
Male 30-34	245,265	32	58,652	
Male 35-39	253,463	37	63,479	
Male 40-44	237,849	42	67,791	
Male 45-49	247,840	47	71,787	
Male 50-54	230,688	52	75,231	
Male 55-59	208,542	57	77,866	
Male 60-64	194,287	62	79,776	
Male 65-69	147,190	67	81,007	
Male 70-74	114,214	72	81,793	
Male 75+	198,095	77	81,793	
Total (n)	3,502,913			
Female 0-4	215,586	2	10,172	

age	(f)	Mid point	Cumulative Freq (fx)	(x f)
Males 0-4	10,746	2	226,319	
Male 5-9	9,636	7	443,617	
Male 10-14	9,909	12	664,092	
Male 15-19	9,924	17	900,157	
Male 20-24	7,723	22	1,161,196	
Male 25-29	6,023	27	1,425,400	
Male 30-34				
Male 35-39				
Male 40-44				
Male 45-49				
Male 50-54				
Male 55-59				
Male 60-64				
Male 65-69				
Male 70-74				
Male 75+				



Female	5-9	205,875	7	19,239	
Female	10-14	210,686	12	28,616	
Female	15-19	223,909	17	38,051	
Female	20-24	247,048	22	45,139	
Female	25-29	261,413	27	50,946	
Female	30-34	247,162	32	55,849	
Female	35-39	258,658	37	61,112	
Female	40-44	242,457	42	66,141	
Female	45-49	252,016	47	70,801	
Female	50-54	237,360	52	74,466	
Female	55-59	214,243	57	77,255	
Female	60-64	195,635	62	79,421	
Female	65-69	151,500	67	80,763	
Female	70-74	122,807	72	81,714	
Female	75+	278,015	77	82,773	
Total (n)		3,564,370			

Figure 3: ABS catalogue number 3101.0
3238.0
 Australian Demographic Statistics and
 Aboriginal ABS catalogue number 3238.0
 Islander Australians, 1991-2021
 Experimental Estimates and Projections, Aboriginal
 and Torres Strait Islander Australians, 1991-2021

Figure 4: ABS catalogue number
 Experimental Estimates and Projections,
 and Torres Strait

Task One: Calculating Summary Statistics

Because of the amount of raw data available for population by age, it is presented in tables using 5 year intervals. One disadvantage of using data that is arranged in class intervals is that it is not possible to calculate exact measures such as mean, median and mode. Instead an estimate can be made using a mid-point to represent the data in each interval.

E.g. for the age interval 0 – 4, (0, 1, **2**, 3, 4) the mid-point is 2.

To make it easier to calculate and draw graphs you can copy and paste the data into an Excel or other spread sheet application. Show all calculations correct to the nearest year.

1. Measures of Centre

Using a spread sheet fill in the mid-point and cumulative frequency columns.

Step 1: Finding the estimate of the mean

The mean is found by $\bar{x} = \frac{\sum xf}{n}$

Step 2: Finding the estimate of the median

The position of the median is located by $\frac{n+1}{2}$ where n is the number of data.

Calculate the value of $\frac{n+1}{2}$ and using the cumulative frequency column, locate the interval that contains this value. Use the mid-point of this interval to fill in the estimate of the median below.

Step 3: Finding the estimate of the mode

The mode is the most frequently occurring interval. Use the mid-point of this interval to fill in the estimate of the mode.

NSW age distribution	Non-Indigenous		Indigenous	
Estimate	Males	Females	Males	Females
Mean	37	38.5	24.8	26
Median	32	32	17	17
Mode (excludes 75+)	27	27	2	2

Comment: *In symmetrical data we expect the mean and the median values to be similar. For non-symmetrical data the mean is pulled towards the tail. We see that the mean and median are not similar and further apart in the indigenous data suggesting the data is skewed. The fact that the mean is higher than the median suggests it has been pulled out by a positive skew. In each of the three measures, the age distribution centre is considerably lower for the Indigenous data than the non-Indigenous.*

2. Measures of Spread

NSW age distribution	Non-Indigenous		Indigenous	
Estimate	Males	Females	Males	Females
Range (max - min)	75+ to 0 = 75+	75+ to 0 = 75+	75+ to 0 = 75+	75+ to 0 = 75+
IQR (Q ₃ - Q ₁)	47 - 12 = 35	52 - 17 = 35	32 - 7 = 25	37 - 7 = 30

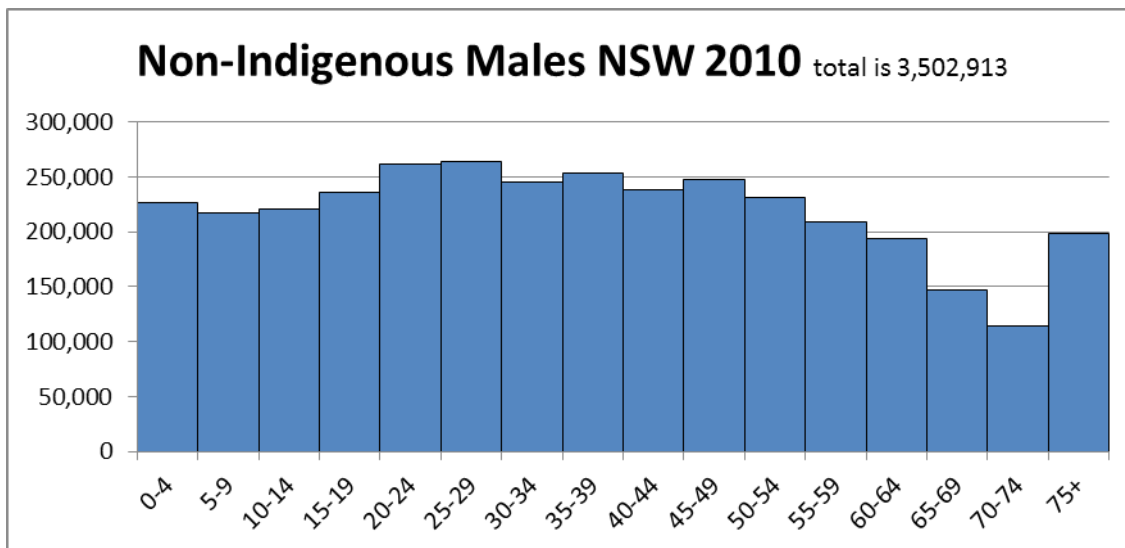
Comment: *The range is the same for each group since all data begins at birth (0 years) and ends in the 75+ age group. The interquartile range shows that the middle 50% of data for the Indigenous population is less spread out than that*

for the non-Indigenous population. See comments for the box plots in question 4 below.

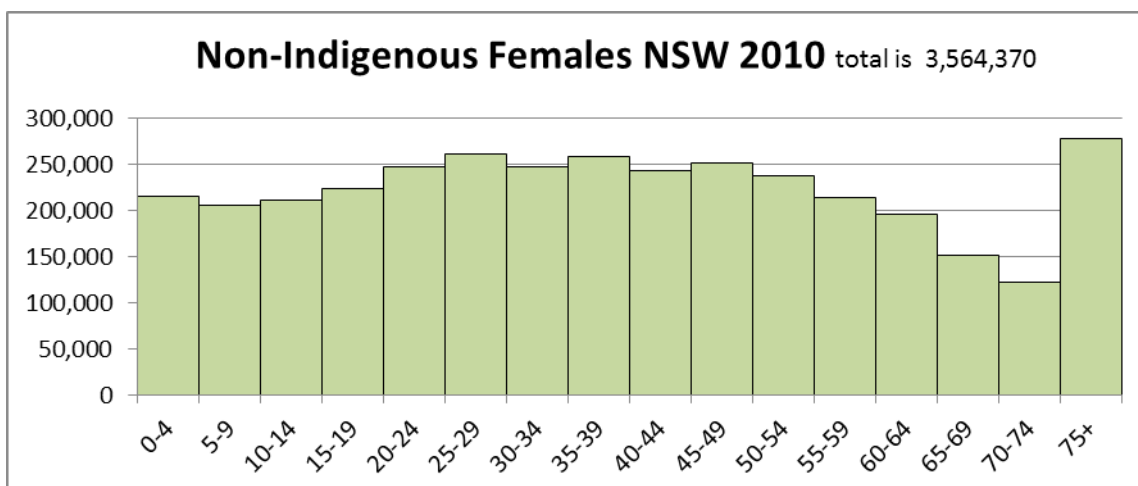
Task Two: Displaying the Data

3. Using the data in Figures 3 and 4 draw a separate histogram for each group.

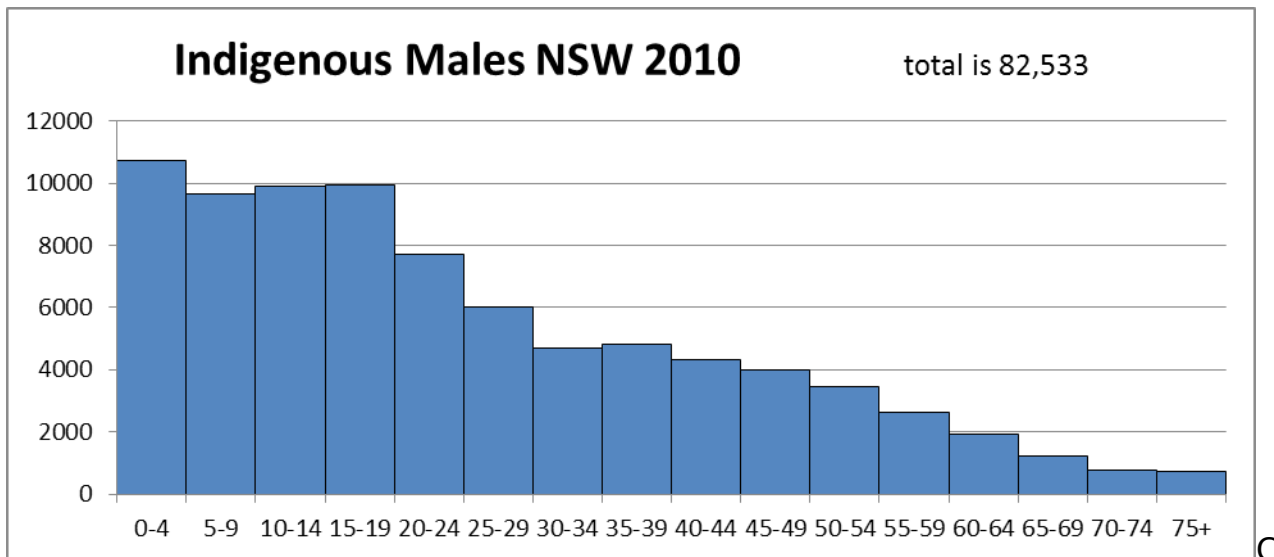
Note: To construct a histogram display the data in a column graph, Right click, select Format Data Series and set the gap width to 0%.



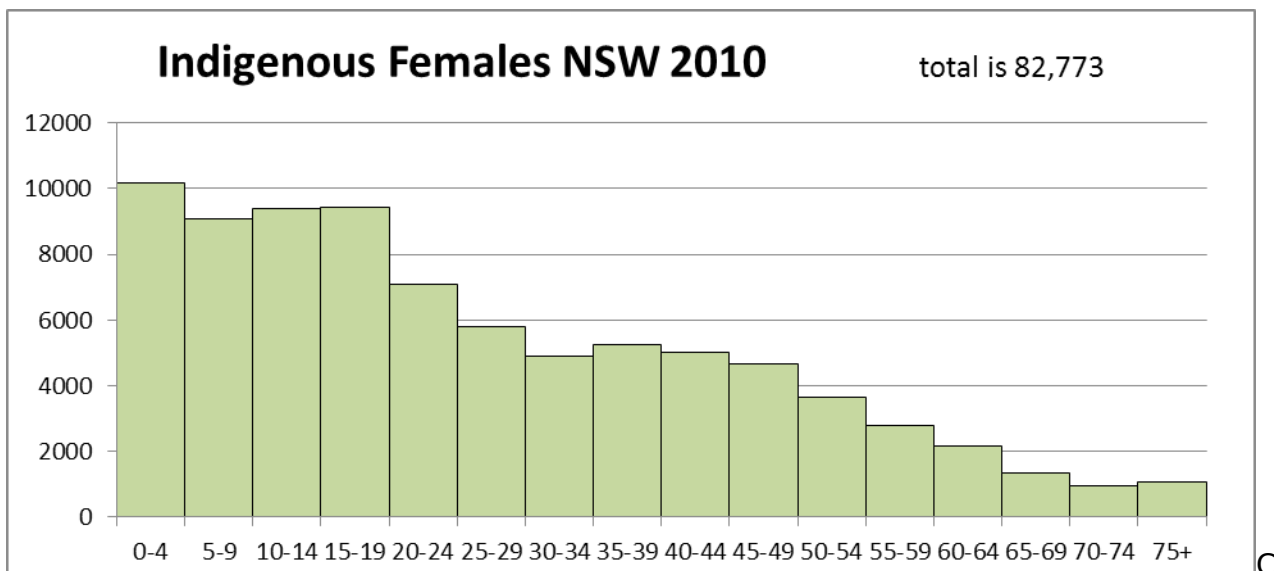
Comment: *Relatively symmetric with a gradual decrease in age groups after 45-49. The greater frequency for the 75+ group is the result of the amalgamation of this data. If spread out we would expect to see a positive skew for males beginning with the 45-49 year old age group.*



Comment: *Similar comment to above*

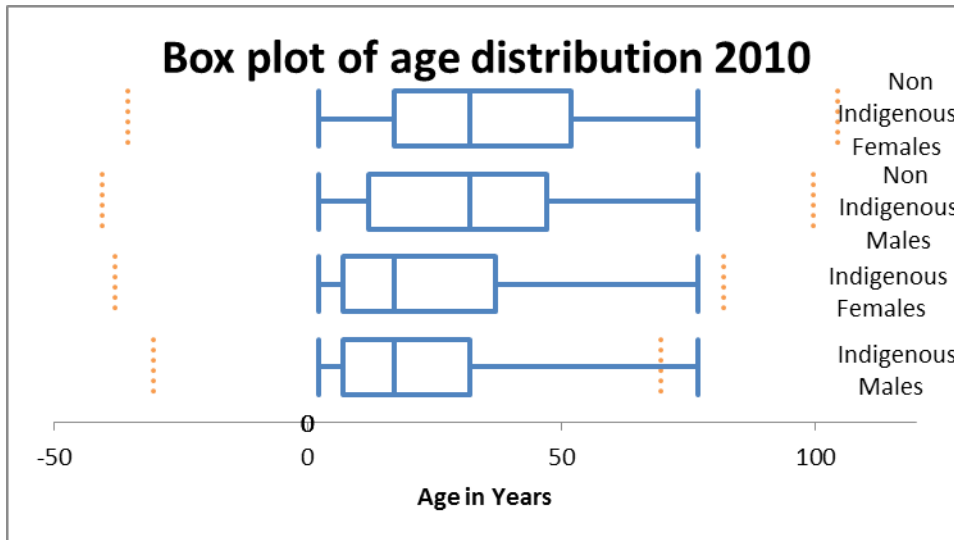


omment: *Positive skew meaning that there are a higher number of Indigenous males in the lower age groups than in the older age groups. As age increases the number of Indigenous males decreases.*



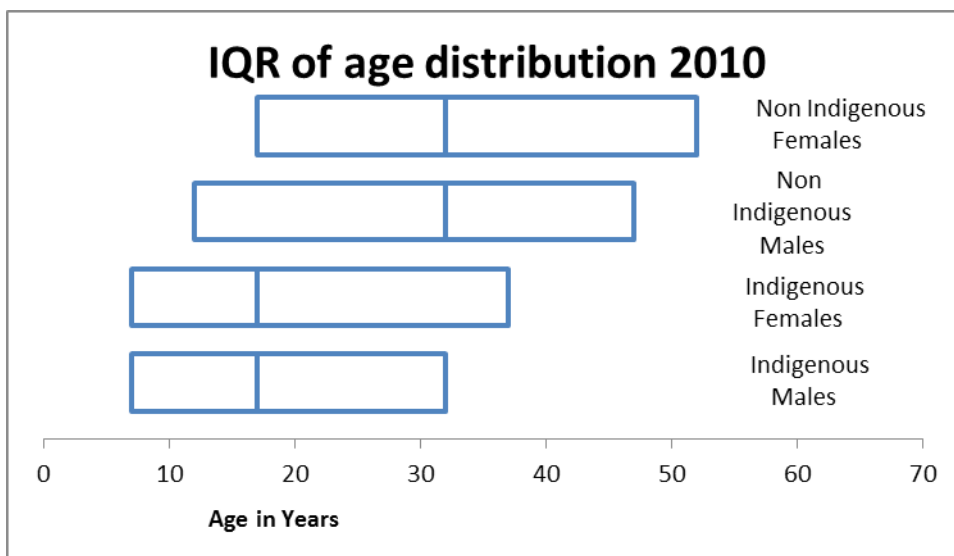
omment: *Similar comment to above.*

4. Based on the same method used to find the median, find Q1 and Q3. Use a 5 figure summary to draw parallel box and whisker plots for each group.



Comment: *The minimum and maximum values add nothing to our understanding of the range of this data since all data starts at 0 years when a baby is born, and ends at 75+. Ages above about 70 for Indigenous males appear as outliers because the middle 50% of ages of this group is quite compact and considerably lower than this value. As noted above in the summary statistics the median age of Indigenous people is higher than Indigenous people by about 15 years.*

More information can be gained by ignoring the whiskers and looking closely at the IQR below.



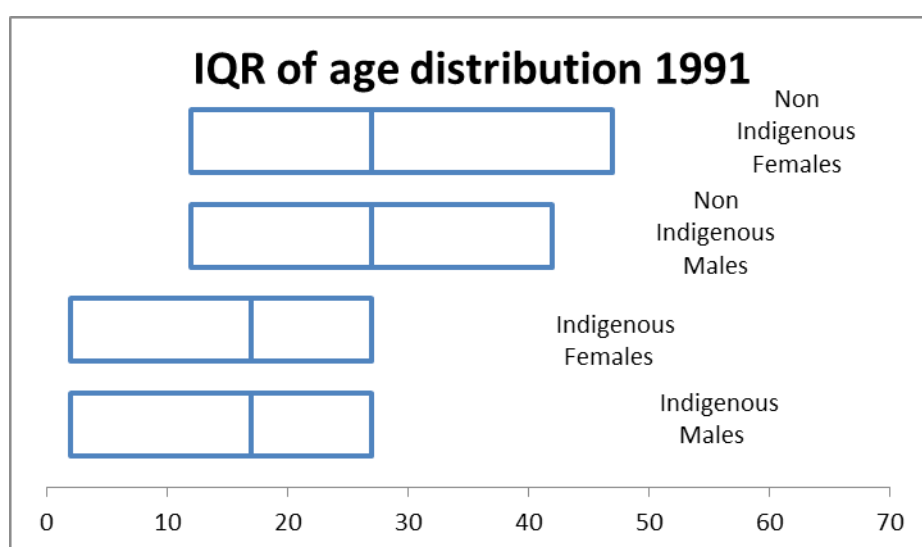
Comment: *The middle 50% age range is greater for non-Indigenous people than Indigenous people.*

The median age is nearly double for the non-Indigenous population i.e. 32 compared with 17 for Indigenous. This means that 50% of the female non-Indigenous population is aged above 32 years whereas 50% of the female Indigenous population is above 17 years old.

While 50% of the male non Indigenous population is more than 32 years old, in the Indigenous male population only 25% is more than 32 years old.

There appears to be a hierarchy of age distribution with males having a lower distribution than females and indigenous people having a lower distribution than non-Indigenous people.

- 5.** Below are box plots from the Indigenous and non-Indigenous populations Australia for the year 1991. Comment on how the age distributions have changed since then.



Comment: In the twenty years since 1991 the median age for non-Indigenous Australian males and females has increased 5 years from 27 to 32. During the same time period, the median age group for Indigenous males and females stayed the same at 17 years.

The range of middle 50% for the age distribution for Indigenous Australians has increased. Indigenous males now have an IQR of 7 – 35 and females 7 – 37. This means that 25% of females are still alive after 37 compared with 27 in 1991, and 25% of Indigenous males live beyond 32 compared with 27 years in 1991. For the non-Indigenous population, 25% of non-Indigenous males live beyond 47 in 2012 compared with 42 in 1991. 25% of non-Indigenous females live to more than 52 years up from 47 years in 1991.

9 Extension

Using ABS data for a different State or Territory repeat the investigation and compare your results with those for NSW.

